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[57] **ABSTRACT**

Method and apparatus for manipulating a microscopic particle by single-beam gradient optical trapping, using an optical beam whose trapping force is substantially independent of position within a view field. The apparatus may be used to extend a polymer filament, and to fix the extended filament at a selected stretching force. When applied to nucleic acid filament, the method may be employed for genomic DNA mapping of filaments up to several megabasepairs in size. The method may also be used for studying the interaction of enzymes or ribosomes with extended DNA in real time.

**16 Claims, 7 Drawing Sheets**